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Mr. Chairman and Members of the Committee, thank you for the opportunity to testify today on behalf of General Motors. I am Larry Burns, GM's Vice President of Research & Development and Strategic Planning, and I am leading GM's effort to develop hydrogen-powered fuel cell vehicles.

GM has placed very high priority on fuel cells and hydrogen as the long-term power source and energy carrier for automobiles. We see this combination as the best way to simultaneously increase energy independence, remove the automobile from the environmental debate, stimulate economic and jobs growth, and allow automakers to create better vehicles that customers will want to buy in high volumes.

High volume is critical. It is the only way to meet the growing global demand for automobiles while realizing the large-scale energy and environmental benefits we are seeking.

GM's R&D program is focused on three areas:

- Developing a fuel cell propulsion system that can compete head-to-head with internal combustion engine systems.
- Demonstrating our progress publicly to let key stakeholders experience firsthand the promise of this technology.
- Collaborating with energy companies and governments to ensure that safe, convenient, and affordable hydrogen is available to our customers, enabling rapid industry transformation to fuel cell vehicles.

We are targeting to design and validate an automotive-competitive fuel cell propulsion system by 2010. By automotive competitive, we mean a system that has the performance, durability, and cost (at scale volumes) of today's internal combustion engine systems.

This aggressive timetable is a clear indication that fuel cell technology for automotive applications is industry driven (rather than government driven) and that this technology has matured to a point where such timing is indeed possible.

We have made significant progress on the technology:

- In the last six years, we have improved fuel cell power density by a factor of seven, while enhancing the efficiency and reducing the size of our fuel cell stack.

- We have significantly increased fuel cell durability, reliability, and cold start capability.
- We have developed safe hydrogen storage systems that approach the range of today's vehicles, and we have begun to explore very promising concepts for a new generation of storage technology.
- We have made significant progress on cost reduction through technology improvements and system simplification.

Our progress has convinced us that fuel cell vehicles have the potential to be fundamentally better automobiles on nearly all attributes important to our customers, a key to enabling high-volume sales. And with just 1/10th as many moving propulsion parts as conventional systems, our vision design has the potential to meet our cost and durability targets.

We have also made excellent progress with respect to vehicle demonstrations:

- Our six-vehicle fleet demonstration here in Washington, D.C. is now in its third year, with almost 3,000 people participating in a ride or drive. We also have other demonstration programs in California, Japan, Germany, and soon in China.
- The D.C. fleet is fueled at a Shell station equipped with a hydrogen pump. This is the first retail outlet dispensing hydrogen fuel in the U.S. and a significant, albeit small, step toward a hydrogen infrastructure.
- We collaborated with the U.S. Army on the development of the world's first fuel cell-powered military truck; it is currently being evaluated and maintained by military personnel at Fort Belvoir.
- We also will field 40 fuel cell vehicles, spanning two technology generations, as part of the Department of Energy's Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project. We are pleased to see that the Energy Bill affirms this demonstration. This is the right size program at the right time. It is large enough to generate real learnings about operating fuel cell vehicles, without being so large that it diverts the resources of automakers from our central focus on automotive-competitive technology.
- GM has also created the AUTOnomy, Hy-wire, and Sequel concepts, which demonstrate how new automotive DNA can transform our vehicles. Sequel, a five-passenger crossover SUV, is the first fuel cell vehicle capable of driving 300 miles between fill ups.

With respect to collaboration, we are working with key partners on virtually every aspect of fuel cell and infrastructure technology. Among our partners are Shell Hydrogen, Sandia National Lab, Dow Chemical, Hydrogenics, and QUANTUM Technologies as well as the Department of Energy, which includes the FreedomCar and Fuel Partnership involving Ford, Chrysler, and five energy companies.

The biggest challenge to a fast industry transformation to hydrogen and fuel cells is the fueling infrastructure. A major advantage of hydrogen is that it can be obtained from numerous diverse pathways, including renewable sources. As such, it promises to relieve our 98-percent dependence on petroleum as an energy source for cars and trucks.

Building a new fueling infrastructure is a formidable task. Fortunately, we are not starting from scratch. A global hydrogen infrastructure already exists today that produces 50 million tons of hydrogen per year – which equals the amount of hydrogen needed to fuel 200 million fuel cell vehicles! While this hydrogen is currently allocated to industrial uses, it shows that hydrogen can be produced and used economically and safely on a huge scale in commerce.

We also do not have to build the infrastructure overnight. It takes about 20 years to turn over the entire vehicle fleet, so it is possible to evolve infrastructure development in line with vehicle production.

GM has calculated that an infrastructure for the first million fuel cell vehicles could be created in the United States at a cost of \$10-15 billion – about half the cost of the Alaskan oil pipeline (when its \$8 billion price tag is converted into today's dollars). This infrastructure would make hydrogen available within two miles for 70 percent of the U.S. population and connect the 100 largest U.S. cities with a fueling station every 25 miles.

While this is a somewhat oversimplified calculation, it demonstrates that an initial hydrogen infrastructure would not be cost prohibitive. In fact, the cost is only a small fraction of the capital the oil industry says it will need to keep up with increasing demand for petroleum.

GM applauds the Department of Energy and the federal government for its hydrogen infrastructure initiatives. However, in our view, much more needs to be done if we are to be ready for the large-scale fuel cell demonstration programs and market growth that we envision for the next decade.

We would like to see the federal government articulate a clear, concise, broadly sanctioned vision that requires agencies beyond DOE and DOD to make hydrogen and fuel cell technology development and application priority areas of engagement.

Clear, consistent, ongoing communication to the American people of this vision and the underlying rationale for hydrogen and fuels cells is also vitally important to building public acceptance of fuel cell vehicles.

The Energy Bill now under consideration by Congress is directionally quite good, but if we are really serious about transforming to a hydrogen economy, there will be more to do in the coming years. The automotive industry alone is probably spending close to \$1 billion per year on fuel cell technology. If government wants to accelerate progress, a greater investment is warranted.

We welcome in particular the Energy Bill's increased funding for R&D. Fuel cells energized by hydrogen fundamentally change the DNA of the automobile. While we have made dramatic progress toward a first-generation automotive-competitive system, like with any new technology, the real volume and benefits will be realized in second-generation designs and beyond. As such, we would like to see a significantly expanded national R&D initiative on breakthrough fuel cell materials, hydrogen storage, and hydrogen generation – leveraging the creative capabilities of our government labs, universities, and industrial research facilities – to help us move quickly to later-generation designs.

Market demand for hydrogen fuel cell vehicles must also be encouraged. The price of hydrogen will be a critical factor and Congress should act now to exempt hydrogen from fuel taxes until, perhaps, at least five million fuel cell vehicles are on the road. Since availability will also be an issue, a generous tax credit would ensure the investments necessary for development of hydrogen filling stations by mitigating the risks of these investments.

Looking past 2010, we must start thinking about moving beyond today's small-scale demonstrations. We welcome the federal fleet purchase program in the Energy Bill and believe Congress should consider doing more in this area. This would be an important bridge to commercially competitive vehicles and high-volume production.

To summarize, General Motors sees hydrogen as the long-term automotive fuel and the fuel cell as the long-term power source. Our fuel cell program seeks to create clean, affordable, full-performance fuel cell vehicles that will excite and delight our customers. We believe customers will buy these vehicles in large numbers and that society will reap the economic, energy, and environmental benefits.

I want to emphasize, however, that this is not just about car companies wanting to sell vehicles. In a very real sense, this is about nation building:

In the 19th century, the construction of the transcontinental railway gave rise to new industries and changed our country's economic destiny. In the 20th century, the development of the interstate highway system achieved similar dramatic results. The creation of a hydrogen-based economy is the 21st century's exercise in nation building. Leadership in hydrogen and fuel cell technology will underscore our pre-eminence in innovation and is absolutely vital to our future. It will ensure our ability to compete on a global basis, enable sustainable economic growth, and spur the creation of exciting new job opportunities for future generations of Americans.

GM is ready and eager to work collaboratively with government, energy companies, and suppliers to drive the hydrogen economy to reality.

Thank you.